

SERUM MAGNESIUM LEVEL IN FEBRILE CONVULSION

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ABSTRACT

Aim

To study relation between serum magnesium levels and febrile convulsion and to compare serum magnesium level in children with febrile convulsion to febrile children with no convulsion.

Material and Methods

A prospective case control study done in Kempegowda Institutes of Medical science, Bangalore between October 2015- October 2016 where 2 groups were made of 45 children each as case and control group. Informed consent was taken by all parents and detailed history, past, birth and family history was taken and serum magnesium levels were done by Roche 9180 electrolyte analyser.

Results

Mean age of cases with febrile convulsion and febrile patients without seizures were 1.97years (+/-) 1.33years and 2.01years (+/-) 1.02 years respectively. there were 24 male and 21 female babies in group 1 and 23 male and 22 females in other group. the mean age and sex were similar in both groups. Mean level of magnesium were 1.97±0.24 and 2.19 ± 0.20 in cases with febrile convulsion and febrile patients without seizures respectively and there was significant differences.

Conclusions

Febrile convulsion is the most common type of convulsion in children. We got a positive co relation between levels of serum magnesium and febrile convulsion. However more studies at a larger level required to establish a strong correlation between the two.

KEYWORDS: Serum Magnesium Levels, Febrile Convulsion & Convulsion

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INTRODUCTION

Febrile convulsion are the most common type of seizures and occur in 2-4 % of children [1] Factors like genetics, neurotransmitters level changes and few trace elements have been introduced as a possible cause [2-4], however, the main cause not known yet. Because 30-40% of children who experience a febrile convulsion will have a recurrence, it makes febrile convulsion an important issue to understand and prevent [5] In the past, blood tests like electrolytes were not suggested, but recently several studies have shown the effect of GABA, ZN, and Fe in developing febrile convulsion offering possible interference of other trace elements. Magnesium is the fourth most common cation in the body and the third most intra cellular cation .50-60% of body magnesium is in bone where it serves as reservoir because 30% is exchangeable, allowing movement to extra cellular space. Most intra

cellular magnesium is bound to protein, of about 25% is exchangeable. Because cells with higher metabolic rate have higher magnesium, most of it is present in muscle and liver. The normal plasma magnesium is 1.5-2.3 mg/dl. Magnesium is essential for membrane utilization and nerve conduction [1]. By definition by AAP criteria, the child should have a febrile illness or certainly fever, neurologically healthy between 6 months to 5 years of age whose seizure is brief (<15min), generalized and occurs only once (simple febrile convulsion) or more times (complex febrile convulsions) during a 24 hour period during a fever [6]. The following objectives to correlate the hypothesis, to find correlation between serum magnesium level and febrile convulsion and to compare level of serum magnesium between children with febrile convulsion and febrile children with no convulsions.

METHOD

This was a prospective case-control study done in Kempegowda Institute of Medical Science, Bangalore between October 2015 to October 2016 which included two groups of patients with 6-60 months of age with febrile convulsion and fever without seizure respectively. Forty five cases were enrolled in each group.

Inclusion Criteria

- Patients between 6 months to 5 years of age of either sex.

Exclusion Criteria

- Electrolyte imbalance due to gastrointestinal disease
- CNS infections (encephalitis, meningitis)
- Metabolic disorder

Detailed history of presenting complaints, type and duration of seizure, past history, birth history and family history was taken. Thorough physical examination was done. Children with congenital or acquired illness were excluded. 2ml of blood was drawn under aseptic precaution and serum magnesium level was measured using Roche 9180 electrolyte analyser. The analysis was done by STATA11.1, data were analysed using T test and Chi square

RESULTS

Mean age of cases with febrile convulsion and febrile patients without seizures were 1.97 years \pm 1.33 years and 2.01 years \pm 1.02 years respectively. There were 24 male and 21 female babies in group-I and 23 male and 22 females in group-II. The mean age and sex were similar in both groups.

Mean level of magnesium were 1.97 \pm 0.24 and 2.19 \pm 0.20 in cases with febrile convulsion and febrile patients without seizures respectively and there was significant difference ($p=0.001$)

Table 1

VARIABLE	GROUP 1	GROUP 2
Serum Mg	1.97 \pm 0.24	2.19 \pm 0.20

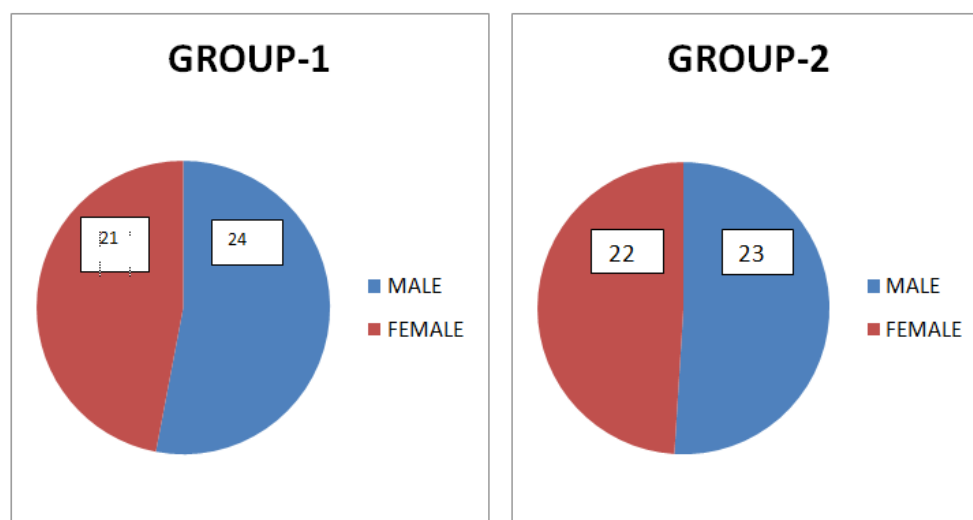


Figure 1

DISCUSSIONS

Action of magnesium level on nervous system is that, it reduces the release of acetyl choline at the neuromuscular junction by antagonizing calcium ions at presynaptic junction, reduced excitability of nerves, and acts as anticonvulsants, reverses cerebral vasospasm [7]. It is suggested that alteration in magnesium concentration in plasma and intracellular matrix give rise to functional impairment of the cell membranes, which might trigger seizures. Recent evidences indicate that the deficiency of magnesium play a significant role in febrile convulsion [7, 8]. Magnesium plays an important role in establishing electrical potential across cell membrane. It also affects calcium metabolism the production of cyclic adenosine monophosphate is magnesium dependent which in turn controls release of parathyroid hormone. [7, 9]. Our study showed difference in magnesium level in between two groups which is similar to Studies done by Prakash, Talebian and Sadinegad [10-12]. However studies done by Burhanoglu, Donalson, Rutter and Heipertz showed no difference in magnesium level [3, 13-15]. A recent study done in Egypt in 2013 in Ain Shams University and National research centre Egypt to asses blood levels of trace elements in familial febrile convulsion concluded that serum selenium and magnesium levels were significant low and logistic regression model in their study showed that selenium and magnesium have protective effect in children with febrile convulsion [16].

CONCLUSIONS

Febrile convulsion is the most common type of convulsion in children. In our study, a positive correlation was found between levels of serum magnesium and febrile convulsion. Hence children with low serum Magnesium level are more prone to get febrile convulsions than children with normal Magnesium levels. However more studies at a larger level required to establish a strong co relation between the two.

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